REMARKS

In an Office Action dated March 21, 2011, claims 29-32, 38-42, 45, and 52-55 were rejected. Herein, claims 29, 52, and 54 have been amended. No new matter has been added. Applicants respectfully request further examination and reconsideration in view of the following remarks.

Applicants wish to thank the Examiner for indicating that claims 43, 44, 46-51, and 56 contain allowable subject matter.

Minor editorial amendments have been made to the specification. No new matter has been added.

I. Claim Rejections under 35 U.S.C. 102

Claims 29-32, 39, 40, 45, and 52-55 were rejected under 35 U.S.C. 102(b) as being anticipated by Maruyama (JP 2003-067969). Applicants respectfully request reconsideration of the above-noted rejection in view of the following.

Claim 29 recites:

(A) a switching device that switches a reflection mirror between a deformed state and a non-deformed state using a magnetic force, the switching device having a hard magnetic member made of a hard magnetic material and a magnetizing unit including a magnetizing coil;

(B) that a voltage is applied to the switching device by a driving circuit;

(C) that the magnetizing unit is (i) capable of applying voltage to the magnetizing coil so that the hard magnetic member enters a state in which the hard magnetic member is magnetized and (ii) capable of applying voltage to the magnetizing coil so that the hard magnetic member, when in the state in which the hard magnetic member is magnetized, enters a state in which the hard magnetic member is demagnetized; and

(D) the voltage is applied by the driving circuit to the magnetizing coil of the switching device only when the reflection mirror is switched between the deformed state and the non-deformed state.

Applicants respectfully submit that the above-noted features of claim 29 are not disclosed, suggested, or otherwise rendered obvious by Maruyama based on the following.

Maruyama is directed to an optical pickup used for optical recording playback in which a variable mirror 409 is attached to permanent magnets 426 via an arrangement of coils 427 ([0036]). Maruyama teaches that an electromagnetic force is generated by applying an electric current to the coils 427 so as to cause the coils 427 to be either attracted to or repelled from each other in order to change the shape of the variable mirror 409 ([0036]).

However, Applicants respectfully submit that Maruyama contains no disclosure relating to the switching between states of magnetization and demagnetization of the permanent magnets 426 in order to change the shape of the variable mirror 409 by a magnetic force, as required by claim 29.

On page 3 of the Office Action, it is noted that the Examiner's appears to agree with the Applicants' argument that the Maruyama reference discloses that the shape of the variable mirror is changed by an electromagnetic force. However, the Examiner states that "[s]ince the permanent magnet retains magnetism after being magnetized by electrical current, in order for the mirror to change to either flat, convex or concave after application of an electric current, the permanent magnet must be demagnetized." Applicants respectfully disagree with the Examiner's comment that it is required to demagnetize the permanent magnets of Maruyama in order to change the shape of the variable mirror into a flat plane shape, a convex shape, or a concave shape after the supply of the electrical current.

In this regard, Applicants note that an electromagnetic force is the result of the Lorentz force asserted by electrically charged particles. A description of the Lorentz force, obtained from the Wikipedia entry entitled "Classical Electromagnetism," is described below.

> "The electromagnetic field exerts the following force (often called the Lorentz force) on charged particles:
>
> $$\mathbf{F} = q\mathbf{E} + q\mathbf{v} \times \mathbf{B}$$

> where all boldfaced quantities are vectors: **F** is the force that a charge q experiences, **E** is the electric field at the location of the charge, **v** is the velocity of the charge, **B** is the magnetic field at the location of the charge.
>
> The above equation illustrates that the Lorentz force is the sum of two vectors. One is the cross product of the velocity and magnetic field vectors. Based on the properties of the cross product, this produces a vector that is perpendicular to both the velocity and magnetic field vectors. The other vector is in the same direction as the electric field. The sum of these two vectors is the Lorentz force.
>
> Therefore, in the absence of a magnetic field, the force is in the direction of the electric field, and the magnitude of the force is dependent on the value of the charge and the intensity of the electric field. In the absence of an electric field, the force is perpendicular to the velocity of the particle and the direction of the magnetic field. If both electric and magnetic fields are present, the Lorentz force is the sum of both of these vectors."[1]

As can be seen from the above, the Lorentz force is variable with respect to charge "q" or the magnetic field "B." Applicants note that charge "q" is proportional to a current value (i.e., having units in coulombs or amps/sec), and as such, the Lorentz force may be changed via changing the value of a supplied current, e.g., changing the value of the current supplied to coils 427 in Maruyama.

As such, in a case where the amount of current supplied to the coils 427 is changed, it is possible to change the attracting force that causes the variable mirror 409 to change shape without demagnetizing the permanent magnets 426. Accordingly, Applicants respectfully submit that the Examiner is incorrect that it is required to demagnetize the permanent magnet of Maruyama in order to change the shape of the mirror into a flat plane shape, a convex shape, or a concave shape after the supply of a current.

Additionally, it is noted that Maruyama fails to explicitly disclose that the permanent magnet is demagnetized in order to change the shape of the variable mirror 409. Applicants note that while it may be possible to demagnetize the permanent magnet in order to change the shape of the variable mirror 409, it is respectfully submitted that demagnetizing the permanent magnet to change the shape of the variable mirror 409 is beyond the implicit teachings of the reference for at least the reasons described above in which it is demonstrated that alternative methods exist

[1] http://en.wikipedia.org/wiki/Classical_electrodynamics, retrieved on June 20, 2011.

to change the shape of the variable mirror 409. Accordingly, Applicants respectfully submit that in order to teach a feature of the shape of variable mirror 409 is changed as the result of demagnetizing a permanent magnet, Maruyama would necessarily need to explicitly disclose such a feature.

On the contrary, paragraph [0036] of Maruyama discloses the following in the English language: "With this arrangement, in the case where proper currents are respectively supplied from respective driving circuits 428 to respective coils 427 in response to a signal from a computing device 414, which has been calculated by the computing device 414 based on the output signals from sensors 415, 416, 417, and 424, and which represents a change in the optical system, the coils 427 are repelled from each other or attached to each other by an electromagnetic force acting between the permanent magnets 426 to thereby deform the substrate 409e and the thin film 409a" (emphasis added).

Accordingly, Applicants note that Maruyama explicitly discloses the opposite of demagnetizing the permanent magnet to change the shape of the variable mirror 409, namely, Maruyama explicitly teaches an electromagnetic force is changed by a current supplied to the coils 427 in order to change shape of the variable mirror 409.

In contrast to Maruyama, claim 29 requires that a hard magnetic member, having a strong magnetic coercive force, is intentionally demagnetized to change the magnetic force generated by the hard magnetic member so as to cause deformation of a reflection mirror.

In particular, claim 29 recites: (A) a switching device that switches a reflection mirror between a deformed state and a non-deformed state using a magnetic force, the switching device having a hard magnetic member made of a hard magnetic material and a magnetizing unit including a magnetizing coil; (B) that a voltage is applied to the switching device by a driving circuit; (C) that the magnetizing unit is (i) capable of applying voltage to the magnetizing coil so that the hard magnetic member enters a state in which the hard magnetic member is magnetized and (ii) capable of applying voltage to the magnetizing coil so that the hard magnetic member, when in the state in which the hard magnetic member is magnetized, enters a state in which the

hard magnetic member is demagnetized; and (D) the voltage is applied by the driving circuit to the magnetizing coil of the switching device only when the reflection mirror is switched between the deformed state and the non-deformed state.

In view of the above, Applicants respectfully submit that Maruyama fails to disclose, suggest, or otherwise render obvious the above-noted features of claim 29. Therefore, claim 29 is patentable over Maruyama.

Additionally, Applicants respectfully submit the advantageous effects achieved by the above-noted features of claim 29 might be more clearly understood in reference to the specification. However, it is noted that reference to any specific drawings or sections of the specification is provided for illustrative purposes, and is not intended to otherwise limit the scope of the claims to any particular embodiments.

In this regard, line 22 of page 25 to line 11 of page 26 of the specification as originally filed recites the following:

> "When a current is passed through the magnetizing coil 10c, a predetermined magnetomotive force is induced, so that the hard magnetic member 10a is magnetized or demagnetized.
>
> Once the hard magnetic member 10a is magnetized, it holds the magnetic field after the current passing through the magnetizing coil 10c is stopped, and attracts the magnetic member 5a by providing a predetermined flux density.
>
> In this instance, the magnetic member 5a is attracted until the back surface of the reflection mirror 5 abuts on the recessed portion 11a in the base 11, which brings the reflection mirror 5 into a deformed state where it abuts on the recessed portion 11a. The reflection mirror 5 is thereby maintained in the shape of a curved surface with the reflection surface forming a concave surface at a constant quantity of deformation."

Applicants respectfully submit that the above-noted passage of the specification as originally filed describes the advantageous effect of controlling a reflection mirror using magnetic force is achieved by intentionally magnetizing or demagnetizing a hard magnetic member, which has a strong magnetic coercive force, in order to change the magnetic force generated by the hard magnetic member so as to cause deformation of the reflection mirror.

Claims 30-32, 39, 40, and 45 are patentable over Maruyama based at least on their dependency from claim 29.

Claim 52 recites: (A) a switching device that switches a reflection mirror between a deformed state and a non-deformed state using a magnetic force, the switching device having a hard magnetic member made of a hard magnetic material and a magnetizing unit including a magnetizing coil; (B) that a voltage is applied to the switching device by a driving circuit; (C) that the magnetizing unit is (i) capable of applying voltage to the magnetizing coil so that the hard magnetic member enters a state in which the hard magnetic member is magnetized and (ii) capable of applying voltage to the magnetizing coil so that the hard magnetic member, when in the state in which the hard magnetic member is magnetized, enters a state in which the hard magnetic member is demagnetized; and (D) the voltage is applied by the driving circuit to the magnetizing coil of the switching device only when the reflection mirror is switched between the deformed state and the non-deformed state. Applicants respectfully submit that Maruyama fails to disclose, suggest, or otherwise render obvious the above-noted features of claim 52 for reasons similar to those discussed above with respect to claim 29. Therefore, claim 52 is patentable over Maruyama.

Claim 53 is patentable over Maruyama based at least on its dependency from claim 52.

Claim 54 recites: (A) a switching device that switches a reflection mirror between a deformed state and a non-deformed state using a magnetic force, the switching device having a hard magnetic member made of a hard magnetic material and a magnetizing unit including a magnetizing coil; (B) that the magnetizing unit is (i) capable of applying voltage to the magnetizing coil so that the hard magnetic member enters a state in which the hard magnetic member is magnetized and (ii) capable of applying voltage to the magnetizing coil so that the hard magnetic member, when in the state in which the hard magnetic member is magnetized, enters a state in which the hard magnetic member is demagnetized; and (C) that a feeding portion supplies an optical head with the power needed to switch the states of the reflection mirror only when the reflection mirror is switched between the deformed state and the non-deformed state.

Applicants respectfully submit that Maruyama fails to disclose, suggest, or otherwise render obvious the above-noted features of claim 54 for reasons similar to those discussed above with respect to claim 29. Therefore, claim 54 is patentable over Maruyama.

Claim 55 is patentable over Maruyama based at least on its dependency from claim 54.

II. Claim Rejections under 35 U.S.C. 103

Claims 38, 41, and 42 were rejected under 35 U.S.C. 103(a) as being unpatentable over Maruyama in view of Nishioka et al. (US 2006/0187563, hereafter "Nishioka"). Applicants respectfully submit that Nishioka fails to provide disclosure that would obviate the above-mentioned deficiencies of Maruyama. Accordingly, claims 38, 41, and 42 are patentable over any combination of Maruyama and Nishioka based at least on their dependency from claim 29.

III. Allowable Subject Matter

Claims 43, 44, 46-51, and 56 were objected to as depending on a rejected base claim. Applicants respectfully request that the objection to claims 43, 44, 46-51, and 56 be withdrawn for reasons similar to those discussed above with respect to claims 29 and 54.

IV. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 29-32 and 38-56 are clearly in condition for allowance. An early notice thereof is earnestly solicited.

If, after reviewing this Amendment, the Examiner believes that there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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